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10/699,097	10/30/2003	Lotien Richard Huang	10434/60901	2657

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EXAMINER	
DAM, DUSTIN Q	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/699,097	HUANG ET AL.	
	Examiner	Art Unit	
	DUSTIN Q. DAM	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 43-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26 and 43-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This Office Action is in response to the Amendments to the Claims and Remarks filed July 8, 2009.

2. In view of the Amendments to the Claims filed July 8, 2009, the rejections of claims 1-26 and 43-46 under 35 U.S.C. 102(b) and 103(a) previously presented in the Office Action sent April 27, 2009 have been withdrawn.

3. Claims 1-26 and 43-45 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 15-17, 19, and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1).

a. With regards to claims 1 and 43, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample loading chamber (160, FIG. 3) and a fluid reservoir (140, FIG. 4) connected by a microfluidic channel (170, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 170 at end towards 160 and outlet at end towards 140), the sample loading chamber is

configured to be structurally capable of loading a sample of charged molecules into the microfluidic device (160, FIG. 4 & see line 61-64, column 6 "liquid loading region 160 at upper end of the plate, for conveniently introducing and removing separation media to and from the separation cavity"), is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a first electrode (132, FIG. 3 is port for "point electrode", see line 55, column 15; the point electrode at port 132 is interpreted to read on the claimed "first electrode") and a second electrode (132, FIG. 3 is port for wire electrode spanning across and into separation cavity via port 132 and isolated from point electrode 132, see line 52-56, column 15; the wire electrode that enters from port 132 is interpreted to read on the claimed "second electrode") configured to be structurally capable of generating a first electric field in the sample loading chamber (the first and second electrodes are interpreted to read on the structural requirements of the claimed limitations, "configured to generate a first electrode field" since both point electrode and wire electrodes at port 132 are disclosed to produce electric potentials, see line 37-58, column 15), the sample loading chamber defining an opening in an outer surface of the microfluidic device (opening formed by plate 122 & 120 at region 160, FIG. 4) wherein at least a portion of the first and second electrodes is in the opening (see line 49-58, column 15 which discloses point electrode at port 132 and wire electrode isolated from point electrode and present in port 132, FIG.3) and wherein, when generated, the first electric field is configured to transfer charged molecules in the sample loading chamber to the inlet of the microfluidic channel, and the fluid reservoir is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via slot 140, FIG.

4), is positioned at the outlet of the microfluidic channel (FIG. 3) and comprises a third electrode (140, FIG. 4 is port for electrode, see line 57-58, column 15) configured to be structurally capable of generating a second electric field with at least the second electrode.

b. With regards to claim 2, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nuclei acid molecules (line 9, column 2).

c. With regards to claim 3, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12 "blood" inherently comprises DNA).

d. With regards to claim 4, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

e. With regards to claim 15, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample unloading chamber (160, FIG. 3) and a fluid reservoir (130, FIG. 4) connected by a microfluidic channel (180, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 180 at end towards 130 and outlet at end towards 160), the sample unloading chamber is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (160, FIG. 4 & see line 61-64, column 6 "liquid loading region 160 at upper end of the plate, for conveniently introducing and removing separation media to and from the separation cavity"), is positioned at the outlet of the microfluidic channel (FIG. 3), and comprises a first electrode (132, FIG. 3 is port for "point

electrode", see line 55, column 15; the point electrode at port 132 is interpreted to read on the claimed "first electrode") and a second electrode (132, FIG. 3 is port for wire electrode spanning across and into separation cavity via port 132 and isolated from point electrode 132, see line 52-56, column 15; the wire electrode that enters from port 132 is interpreted to read on the claimed "second electrode") configured to be structurally capable of generating a first electric field in the sample unloading chamber (the first and second electrodes are interpreted to read on the structural requirements of the claimed limitations, "configured to generate a first electrode field" since both point electrode and wire electrodes at port 132 are disclosed to produce electric potentials, see line 37-58, column 15), the sample unloading chamber defining an opening in an outer surface of the microfluidic device (opening formed by plate 122 & 120 at region 160, FIG. 4) wherein at least a portion of each of the first and second electrodes is in the opening (see line 49-58, column 15 which discloses point or wire electrodes at 132 and 135) and wherein, when generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the sample unloading chamber, and the fluid reservoir is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a third electrode (130, FIG. 3 is port for electrode, see line 38-44, column 7 "130a") configured to be structurally capable of generating a second electric field with at least the second electrode.

f. With regards to claim 16, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

g. With regards to claim 17, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12"blood" inherently comprises DNA).

h. With regards to claim 19, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 5-7, 9, 10, 13, 20-22, 24, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1).

a. With regards to claims 5, 44, and 45, WIKTOROWICZ et al. discloses an integrated microfluidic devices comprising a sample loading chamber (160, FIG. 3) and a fluid reservoir (140, FIG. 4) connected by a microfluidic channel (170, FIG. 3), wherein

the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 170 at end towards 160 and outlet at end towards 140), the sample loading chamber is configured to be structurally capable of loading a sample of charged molecules into the microfluidic device (160, FIG. 4 & see line 61-64, column 6 "liquid loading region 160 at upper end of the plate, for conveniently introducing and removing separation media to and from the separation cavity"), is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a first electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 "132a" or wire electrode spanning across and into separation cavity via port 132, see line 52-56, column 15) configured to be structurally capable of generating a first electric field in the sample loading chamber, and a separation media located in the sample loading chamber (line 11-15, column 16), wherein the separation media is configured for loading the charged molecules into the sample loading chamber of the microfluidic device (the separation media is interpreted to read on the claimed limitations of "configured for loading the charged molecules into the sample loading chamber of the microfluidic device" because line 36-44, column 7 discloses sample present in the separation media in sample loading chamber 160 and line 61-34, column 6 discloses the separation media is introduced and removed, or in other words structurally capable of loading or unloading, to and from the device via loading chamber 160), and wherein, the sample loading chamber defining an opening in the microfluidic device (opening formed by plate 122 & 120 at region 160, FIG. 4) wherein at least a portion of the first and second electrodes is in the opening (see line 49-58, column 15 which discloses point or

wire electrodes at 132 and 135) and when generated, the first electric field is configured to transport the charged molecules from the separation media and to transfer the charged molecules to the inlet of the microfluidic channel, and the fluid reservoir is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via port 140, FIG. 40), is positioned at the outlet of the microfluidic channel (FIG. 3) and comprises a third electrode (140, FIG. 4 is port for electrode, see line 57-58, column 15) configured to be structurally capable of generating a second electric field with at least the second electrode. WIKTOROWICZ et al. also discloses it may be desirable for sample detection after electrophoresis in the second dimension (line 32-38, column 4) which may include optical detection (line 43-56, column 16).

WIKTOROWICZ et al. also does not appear to explicitly comprise a single embodiment correlated with the referenced Figures which discloses the use of a matrix material in the sample loading chamber.

However, WIKTOROWICZ et al. discloses the use of two different separation media in each separation zone, the cited sample loading zone 160 being the first of the two zones (line 11-15, column 16). WIKTOROWICZ et al. also discloses it is "conventional" to use a matrix material as a separation media particularly in the first separation zone (line 24-27, column 2).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the specific embodiments of WIKTOROWICZ et al. referenced to the Figures and include a matrix material in the sample loading chamber because WIKTOROWICZ et al. suggests different materials may be used in two

dimensional electrophoreses in which conventionally matrix materials are used as separation media which would provide for expected predictable results in the combination and because matrix materials are well known in the art specifically as separation media in which the simple substitution of a known element known in the art for the performing the same function is matter of obviousness; e.g. separation media substitution (See MPEP 2141{III}{B}). Modified WIKTOROWICZ et al. provides for **the** matrix material to only be present in the sample loading chamber, especially since WIKTOROWICZ et al. discloses the use to different separation media in each separation zone. Transferring charged molecules in a matrix material separation media is interpreted to include electro-eluting.

b. With regards to claim 6, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

c. With regards to claim 7, independent claim 5 and dependent claim 6 are obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12 "blood" inherently comprises DNA).

d. With regards to claim 9, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an

integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

e. With regards to claim 10, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKITOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are polypeptide (line 8-12, column 2) sodium dodecyl sulfate supra molecules (line 29-34, column 2 "SDS").

f. With regards to claim 13, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the sample chamber comprises three electrodes (line 52-58, column 15).

g. With regards to claims 20, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample unloading chamber (160, FIG. 3) and a fluid reservoir (130, FIG. 4) connected by a microfluidic channel (180, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 180 at end towards 130 and outlet at end towards 160), the sample unloading chamber is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (160, FIG. 4 & see line 61-64, column 6 "liquid loading region 160 at upper end of the plate, for conveniently introducing and removing separation media to and from the separation cavity"), is positioned at the outlet of the microfluidic channel (FIG. 3), and comprises a first electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 "132a" or wire electrode spanning across and into separation cavity via

port 132, see line 52-56, column 15) configured to be structurally capable of generating a first electric field in the sample unloading chamber, and a section of separation media in the sample unloading chamber (line 11-15, column 16), wherein the section of separation media is configured for unloading the charged molecules from the sample unloading chamber of the microfluidic device (the separation media is interpreted to read on the claimed limitations of "configured for unloading the charged molecules from the sample unloading chamber of the microfluidic device" because line 36-44, column 7 discloses sample present in the separation media in sample unloading chamber 160 and line 61-34, column 6 discloses the separation media is introduced and removed, or in other words structurally capable of loading or unloading, to and from the device via unloading chamber 160), and wherein, when generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the sample unloading chamber (the first and second electrodes are interpreted to read on the structural requirements of the claimed limitations, "configured to generate a first electrode field" since both point electrodes 135 and 132 and wire electrodes at port 132 are disclosed to produce electric potentials, see line 37-58, column 15), thereby providing for unloading the charged molecules from the microfluidic device in the section of separation media (the separation media is interpreted to read on the claimed limitations of "thereby providing for unloading the charged molecules from the microfluidic device" because line 36-44, column 7 discloses sample present in the separation media in sample unloading chamber 160 and line 61-34, column 6 discloses the separation media is introduced and removed, or in other words structurally capable of loading or unloading,

to and from the device via unloading chamber 160), and the fluid reservoir is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a third electrode (130, FIG. 3 is port for electrode, see line 38-44, column 7 "130a") configured to be structurally capable of generating a second electric field with at least the second electrode.

WIKTOROWICZ et al. also does not appear to explicitly comprise a single embodiment correlated with the referenced Figures which discloses the use of a matrix material in the sample unloading chamber.

However, WIKTOROWICZ et al. discloses the use of two different separation media in each separation zone, the cited sample unloading zone 160 being the first of the two zones (line 11-15, column 16). WIKTOROWICZ et al. also discloses it is "conventional" to use a matrix material as a separation media particularly in the first separation zone (line 24-27, column 2).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the specific embodiments of WIKTOROWICZ et al. referenced to the Figures and include a matrix material in the sample unloading chamber because WIKTOROWICZ et al. suggests different materials may be used in two dimensional electrophoreses in which conventionally matrix materials are used as separation media which would provide for expected predictable results in the combination and because matrix materials are well known in the art specifically as separation media in which the simple substitution of a known element known in the art

for the performing the same function is matter of obviousness; e.g. separation media substitution (See MPEP 2141{III}{B}).

h. With regards to claim 21, independent claim 20 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

i. With regards to claim 22, independent claim 20 and dependent claim 21 are obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12"blood" inherently comprises DNA).

j. With regards to claim 24, independent claim 20 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

9. Claims 8, 14, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1), as applied to claims 5-7, 9, 10, 13, 20-22, 24, 44, and 45, and in further view of ADCOCK (U.S. Patent 4,959,133).

a. With regards to claim 8, independent claim 5 and dependent claim 7 are obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

b. With regards to claim 14, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the two electrodes generate repeatedly inverted electric pulses.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

c. With regards to claim 23, independent claim 20 and dependent claim 22 are obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. Modified WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a plurality of electrodes.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2×10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by modified WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

10. Claims 11, 12, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1), as applied to claims 5-7, 9, 10, 13, 20-22, 24, 44, and 45, and in further view of GAUTSCH (U.S. Patent 6,162,602).

a. With regards to claim 11 and 12, independent claim 5 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the section of matrix material is an agarose gel plug.

However, GAUTSCH discloses a method for nucleic acid base sequencing and discloses separating fragments by means of capillary electrophoresis employing agarose or polyacrylamide gel (line 10-17, column 3).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the section of matrix material in the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., with an agarose gel plug, as disclosed by GAUTSCH, because the agarose gel is an improved method over slab gel and agarose is a functional equivalent to the polyacrylamide (GAUTSCH: line 10-17, column 3) and one with ordinary skill would have a reasonable expectation of success since both modified WIKTOROWICZ et al. and GAUTSCH are concerned with separating fragments.

b. With regards to claim 25 and 26, independent claim 20 is obvious over WIKTOROWICZ et al. under 35 U.S.C. 103(a) as discussed above. Modified

WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a section of matrix material.

Modified WIKTOROWICZ does not appear to explicitly disclose an integrated microfluidic device wherein the section of matrix material is an agarose gel plug.

However, GAUTSCH discloses a method for nucleic acid base sequencing and discloses separating fragments by means of capillary electrophoresis employing agarose or polyacrylamide gel (line 10-17, column 3).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the section of matrix material in the integrated microfluidic device, as disclosed by modified WIKTOROWICZ et al., with an agarose gel plug, as disclosed by GAUTSCH, because the agarose gel is an improved method over slab gel and agarose is a functional equivalent to the polyacrylamide (GAUTSCH: line 10-17, column 3) and one with ordinary skill would have a reasonable expectation of success since both WIKTOROWICZ et al. and GAUTSCH are concerned with separating fragments.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1) in view of ADCOCK (U.S. Patent 4,959,133).

a. With regards to claim 18, independent claim 15 and dependent claim 17 are clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a plurality of electrodes.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

Response to Arguments

12. Applicant's arguments filed July 8, 2009 have been fully considered but they are not persuasive.

a. Applicant's arguments filed July 8, 2009 begin on page 7 of the response with a summation of the rejected claims. Applicant then points out, starting on page 8 of the response, that rejections under 35 U.S.C. 103(a) must not require substantial reconstruction and redesign of the elements as well as redesign to change the basic principle of operation. Applicant then points out from page 9 to 10 the alleged differences in the claimed structure of the independent claims from that of WIKTOROWICZ described on page 11 of the response. Applicant argues, starting on page 12 of the

response filed July 8, 2009, that WIKTOROWICZS discloses a "liquid region 160...for introducing and removing separation media to and from the separation cavity" and that one of ordinary skill would not understand the device, as a whole, includes a region 160 that constitutes the claimed sample loading chamber and sample unloading chamber. Applicant then supports this allegation by elaborating on one of the non limiting examples of the WIKTOROWICZ reference, which is described on pages 12 to 13 of the response filed July 8, 2009, where sample is introduced into port 130, then through electrophoresis the sample moves from port 130 until the fastest migrating component of the sample reaches port 132, which port 132 is in the loading/unloading chamber 160. Even by applicant's own admission, sample is transported from port 130 into the chamber 160 towards port 132. Hence, chamber 160 is interpreted to read on the claimed "sample loading chamber" because by the disclosure of WIKTOROWICZ, and by applicant's own admission, sample from port 130 is transported, or in other words loaded, into chamber 160 towards port 132. Furthermore, the claimed sample loading chamber and unloading chamber are not currently claimed to require positive process steps of loading or unloading sample into chamber 160 of the WIKTOROWICZ reference, which appears to meet all the structural requirements of the claims because the claims were filed in the statutory class of an apparatus. Similarly, the chamber 160 of the WIKTOROWICZ is interpreted to read on the claimed "sample unloading chamber" because WIKTOROWICZ positively discloses, as applicant has also admitted, separation media being introduced or removed to and from chamber 160 and, as discussed above, WIKTOROWICZ discloses sample migrating into chamber 160 towards port 132. As the

separation media can be loaded and unloaded to and from chamber 160, and sample is present in the separation media in chamber 160, the sample in the separation media is structurally capable of being unloaded from the device. Applicant then argues starting on page 14 of the response filed July 8, 2009 that the principle operation of the device of WIKTOROWICZ cannot allow samples to be loaded or unloaded from region 160. Applicant cites a portion of the WIKTOROWICZ reference disclosing the device does not require a crosslinked matrix, however the cited section says only that. The device and method of the WIKTOROWICZ reference, although not requiring, is not exclusively limited to operations without the use of a matrix or even a crosslinked matrix. Applicant then elaborates into page 15 that one of ordinary skill in the art would only consider port 130 as the sample loading chamber and that the examiner's cited chamber 160 of the WIKTOROWICZ reference cannot be considered a sample loading or unloading chamber. Applicant alleges one of ordinary skill would understand introducing or removing samples from region 160 would change the principle operation of the device of WIKTOROWICZ. It is noted that the claimed language does not require any loading or unloading of sample from the chamber, only that the chamber configured to, or structurally capable of, loading and removing sample into or out of the chamber. As best understood by the examiner, applicant's specification discloses separation media which contains the sample and a device comprises an aperture, hole, well, or in other words a chamber, which applicant constitutes the loading/unloading chamber. WIKTOROWICZ comprises a device wherein the separation media contains the sample (separation media in chamber 160 contains sample after it migrates from port 130 to 132) and the device

comprises an aperture, hole, well, or in other words a chamber which is integral to chamber 160. Thus, the cited chamber 160 is interpreted to read on the claimed sample loading chamber and sample unloading chamber.

b. Applicant then argues from page 15 to 16 of the response filed July 8, 2009 that the examiner has used impermissible hindsight to reconstruct the present claims by citing the WIKTOROWICZ reference comprises two electrodes in the sample loading/unloading chamber. This is unclear, but to clarify, the examiner is simply looking to FIG. 3 of the WIKTOROWICZ reference and lines 52-56, column 15 to show two electrodes in the chamber opening. See rejection above.

c. Applicant then argues starting on page 16 of the response filed July 8, 2009, that the use of matrix material is WIKTOROWICZ is not required then makes a conclusion that since matrix material is not require, this somehow limits operation of the device of WIKTOROWICZ to methods which do not have matrix materials. This conclusion is not persuasive as it is not based on any facts. It is not a proper characterization of the WIKTOROWICZ reference to say a non limiting preference to use non matrix type separation media exclusively limits operation of the device to separations media of non matrix type.

d. Applicant then argues on page 17 of the response filed July 8, 2009 that the WIKTOROWICZ reference does not disclose a first and second electrode in the openings of the sample loading/unloading chamber. However, this feature is disclosed in the WIKTOROWICZ reference as cited above in the rejections and this feature is also disclosed in the WIKTOROWICZ reference as admitted by applicant on page 14 of the

response filed July 8, 2009 describing a wire electrode in port 132 isolated from a point electrode in port 132.

e. As best understood, the remaining arguments in the response filed July 8, 2009 with regards to the NORDMAN, ADCOCK, and GAUTSCH references are directed towards the WIKTOROWICZ reference and are addressed above.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DUSTIN Q. DAM whose telephone number is (571)270-5120. The examiner can normally be reached on Monday through Thursday, 6:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Michener can be reached on (571)272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

dd
November 17, 2009

/Jennifer K. Michener/
Supervisory Patent Examiner, Art Unit 1795